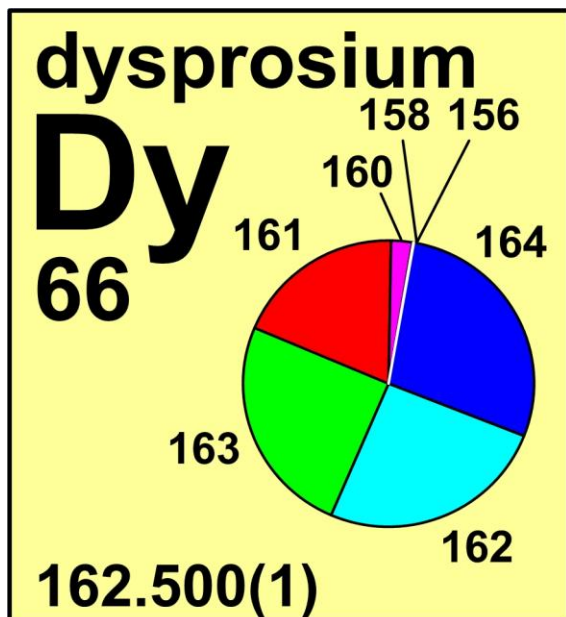





dysprosium

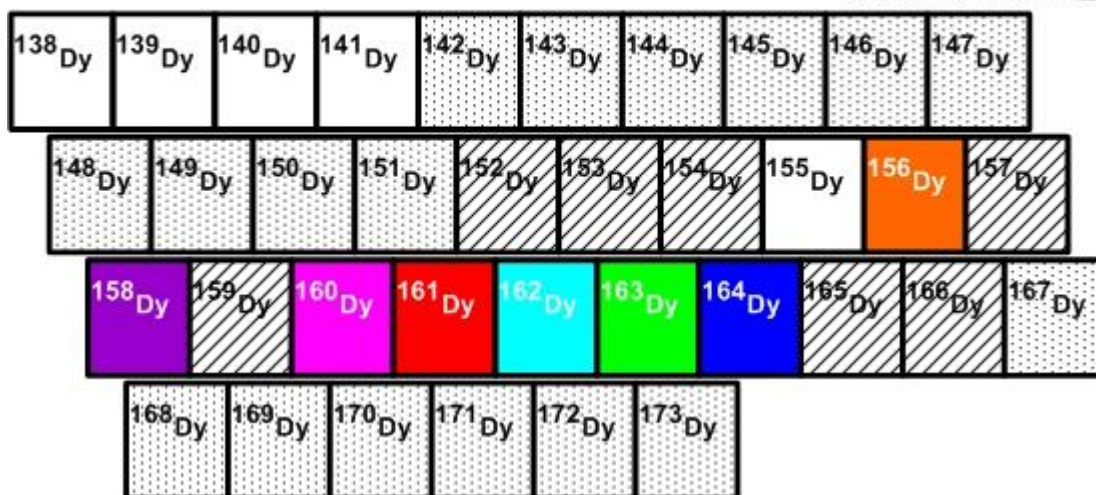


Stable isotope	Atomic mass*	Mole fraction
¹⁵⁶ Dy	155.924 283	0.000 56
¹⁵⁸ Dy	157.924 409	0.000 95
¹⁶⁰ Dy	159.925 1975	0.023 29
¹⁶¹ Dy	160.926 9334	0.188 89
¹⁶² Dy	161.926 7984	0.254 75
¹⁶³ Dy	162.928 7312	0.248 96
¹⁶⁴ Dy	163.929 1748	0.282 60

* Atomic mass given in unified atomic mass units, u.

Half-life of radioactive isotope

Less than 1 second 
Between 1 second and 1 hour 
Greater than 1 hour 



Important applications of stable and/or radioactive isotopes

Isotopes in physics

- 1) The isotopes of dysprosium are highly magnetic lanthanides and have been the subject of physics research looking at the isotope interactions and structure of lattice supersolids and quantum liquid crystals. By using laser light for cooling ("Doppler cooling") and magnetic quadrupole fields for slowing and "trapping" the neutral atoms, the Magneto-Optical trapping (MOT) chamber is used for slowing atoms to study the physics of neutral atoms.

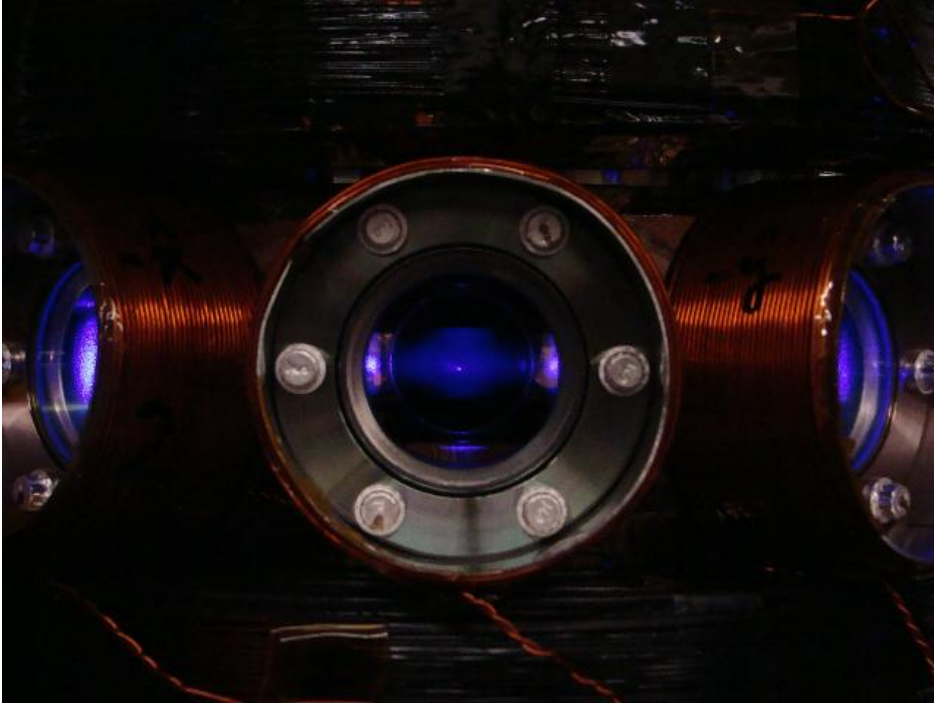


Figure 1: Magneto-optical trapping (MOT) of isotopes of dysprosium.

- 2) ^{156}Dy has been used to study double electron capture, which is the process in which two protons capture two orbital electrons, forming two neutrons in the nucleus, thus forming a new element with the same atomic mass, but with two less protons.
- 3) ^{161}Dy has been a highlighted isotope looking at the Mössbauer Effect which is the resonance and absorption of gamma ray emissions on nearby atoms in a solid state.

Isotopes in medicine

- 1) ^{165}Dy is used commonly in arthritis therapy. Rheumatic synovitis is often treated by intraarticular injection of ^{165}Dy -ferric oxide macroaggregates directly in to the knee. Leakage from the joint has been shown to be very minimal.
- 2) ^{166}Dy which decays to ^{166}Ho is used in cancer and arthritis therapy. The ^{164}Dy to ^{166}Ho route gives the advantage of generating so-called carrier free material encapsulating the ^{164}Dy which decays to ^{166}Ho giving the patient a localized dose of radiotherapy. The capsule is easily removed after the therapy session, but the negative aspect of this type of therapy is the potential for leakage of the radioactive isotope in the body.